

## **Kobuk River Test Fishing Project, 1993**

by

Tracy Lingnau

Regional Information Report<sup>1</sup> No. 3A93-20

Alaska Department of Fish and Game  
Division of Commercial Fisheries, AYK Region  
333 Raspberry Road  
Anchorage, Alaska 99518-1599

November 1993

---

<sup>1</sup> The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate needs for up-to-date information, reports in this series may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author of the Division of Commercial Fisheries.

## TABLE OF CONTENTS

	Page
LIST OF TABLES . . . . .	iii
LIST OF FIGURES . . . . .	iii
INTRODUCTION . . . . .	1
METHODS . . . . .	2
Site Description . . . . .	2
Test Fishing . . . . .	2
Standardized Catches . . . . .	2
RESULTS . . . . .	3
CONCLUSIONS . . . . .	4

## LIST OF TABLES

Table	Page
1. Kobuk River drift test fish chum salmon CPUE by day, drift and site, 1993. . . . .	5
2. Kobuk River drift test fish chum salmon CPUE indices, mean CPUE and percent by drift (time of day) and site (location), 1993. . . . .	6
3. Comparison of chum salmon age and sex composition and mean length in the Kotzebue District commercial catch and commercial test nets compared to the Kobuk River and Noatak River drift test fish catch, 1993. . . . .	7
4. Kobuk River climatological data, 1993 . . . . .	8
5. Kobuk River drift test fish chum salmon diurnal and spacial distribution expressed as mean CPUE by drift period and by site, 1993. . . . .	9
6. Kobuk River drift test fish CPUE and cumulative CPUE by drift, 1993. . . . .	10
7. Kobuk River drift test fish mean daily and cumulative CPUE, daily and cumulative CPUE proportions, 1993. . . . .	12

## LIST OF FIGURES

Figure	Page
1. Kotzebue Sound commercial fishing district, villages and subsistence fishing areas, and major chum salmon spawning tributaries. . . . .	13
2. Lower Kobuk River, vicinity of Kiana, test fish sites, 1993 . . . . .	14
3. Kobuk River drift test fish daily CPUE, 1993 . . . . .	15
4. Kobuk River drift test fish cumulative CPUE and cumulative proportions, 1993. . . . .	16

## INTRODUCTION

The Kobuk River originates on the south side of the Brooks Range in the Arrigetch Mountains inside the Gates of the Arctic National Park. The river flows roughly 500 river miles west where it terminates at Kobuk Lake. The lower 2/3 of the river is stained by tannin from some of the upper river tributaries. Five villages are located on the Kobuk River and all depend on Kobuk River chum salmon for subsistence use. Residents of Kotzebue also depend on Kobuk River chum salmon as a subsistence resource. The Kobuk River also supports up to 50% of the commercial catch of chum salmon in the Kotzebue District.

A drift gill net test fishing project operated in the lower Kobuk River for the first time in 1993. A test fishing project on the Noatak River was initiated in 1975 and continued through 1978, then operated again from 1987 to 1991. A Kobuk River test fishing project was considered in the mid 1980's but because of the importance of the Noatak River chum salmon stocks to the commercial fishery and it's close proximity, the test fishery was instituted on the Noatak River instead. The Noatak River now has an operational sonar project monitoring the chum salmon migration in that river. The only previous salmon project on the Kobuk River was a counting tower site on the Squirrel River, which was too distant to provide timely information. Because of the Kobuk River's tannic stain, test fishing is less susceptible to the net avoidance by salmon often associated with clear water systems. This was a problem with the Noatak River test fishing project during years with low and clear water. This report represents the result of the first year of the Kobuk River drift test fishing project.

Management of the Kotzebue District commercial salmon fishery, particularly during the month of July, is dependent primarily on comparing commercial fishing period and cumulative season catch statistics to those of prior years. The drift test fishing project was initiated because of its relatively low cost and the need for an inseason escapement index for Kobuk River chum salmon stocks, which largely support the first half of the commercial season in the Kotzebue District.

The objectives of the test fishing project for 1993 were:

1. Evaluate the feasibility of indexing chum salmon abundance in the Kobuk River using systematic drift gill net catches.
2. Describe the migratory timing for chum salmon in the lower Kobuk River.
3. Sample for age, sex, and size data.

In addition, a long term goal of the project, once sufficient historical data are available for comparison, is to assess the impact of the Kotzebue District commercial salmon fishery on chum salmon abundance in the lower Kobuk River for fisheries management purposes.

## METHODS

### Site Description

The site is approximately 70 river miles from the Kobuk Lake boundary markers of the commercial salmon fishing district (Figure 1). This is the nearest location to Kotzebue where the river runs through a single channel. The test fishing site was selected because of its desirable stream characteristics. The site consists of a 1-1/2 mile river section located approximately 3 miles downstream from Kiana. The width of the river was approximately 226 meters and was divided into two sites (Figure 2). Site N is the north side of the river (right bank), which is the cut bank side of the river with the swiftest current. Site S is located on the south side of the river (left bank). Site S is located downstream from a major sandbar and has a gradual gradient. It is also the site with the slowest current.

### Test Fishing

Fishing was scheduled to sample salmon passage during three different segments of the day at each of the three sites; morning (0800), mid-day (1500), and late evening (2200). Drifts were conducted by a two person crew, six days a week.

All test fishing drifts were made from a 20 foot outboard motorboat for approximately 20 minutes with a 50 fathom gill net. The net was composed of 5-7/8 in (14.9 cm) stretched mesh multifilament webbing, 45 meshes deep, and hung at a ratio of 2:1. Caught salmon determined to be healthy were released. Age-sex-length data were collected from all other chum salmon. Mortalities were given to nonprofit organizations or individuals for subsistence purposes.

### Standardized Catches

Actual catches were converted to catch per unit of effort (CPUE) by considering fishing time and the length of net used. Each CPUE index was the number of fish which would have been caught if 100 fathoms of net had been fished for 60 minutes. The index ( $I$ ) was calculated as follows:

$$I = \frac{6,000 (c)}{(l) (t)}$$

Where:  $c$  = number of chum salmon caught  
 $l$  = length of net in fathoms  
 $t$  = mean fishing time in minutes

Mean fishing time was defined as the amount of time the entire net was fishing plus half the time it took to set and retrieve the net. Specific site catches were combined into an average drift time period CPUE index which was calculated by weighing the catch information from each site equally. Mean daily drift CPUE indices were summed to produce cumulative and total seasonal CPUE indices for the period of data collection. Cumulative proportions of seasonal total test fish

CPUE indices were also calculated.

Seasonal abundance by site was indexed by summing specific CPUE indices at each site across all time periods fished. Temporal and spatial distribution was described as a percent calculated by using seasonal mean CPUE rather than total CPUE indices, since the number of drifts made at each site and time period fished varied.

## RESULTS

Drifting began on July 12 and continued through August 13. CPUE indices were calculated for each drift and site (Table 1). There were 551 chum salmon caught in a total of 136 drifts (82 drift time periods) producing 1,376.0 chum salmon CPUE index points (Table 2). Peak catch occurred on August 5 with a catch of 112 salmon. The daily CPUE was 89.3 which comprised 18.0% of the seasonal CPUE index. A total of 25.4, 43.4 and 31.1 percent of the seasonal CPUE indices was caught at 0800, 1500, and 2200 hours. A total of 28.7 and 71.3 percent of the total seasonal CPUE indices was caught at sites N and S. The time of day with the most movement was during mid-afternoon as shown with 43.4% of the seasonal CPUE. Not unusual was the higher proportion of the seasonal CPUE (71.3) being caught from the portion of the river with the slower current at Site S.

Scales were analyzed from 462 chum salmon caught in test nets. The age composition was 1.7% Age-0.2, 28.8% Age-0.3, 66.0% Age-0.4 and 3.5% Age-0.5 (Table 3). The age composition of the 1993 Kotzebue commercial and Noatak River test fish catch is shown for comparison. Length by age comparison indicates that the Kotzebue commercial and commercial test samples were similar in size to the Kobuk River drift test fish catch. However, chums caught in test nets at the Noatak River sonar site were smaller than both the Kotzebue commercial and commercial test and Kobuk River drift test fishing catch samples.

Of the 551 chum salmon caught in the Kobuk River test fishery, those in good condition were released (89 or 16%). The rest were given to local residents using daily CB announcements notifying people about the availability of salmon.

The basic test fishing operation was set up the same as it had been in prior years on the Noatak River. Fishing times were changed to sample more evenly throughout the day. Drift sites were reduced from 3 to 2 because of the narrower river channel. The test fishing gear was intended to match the same gear being used in the commercial fishery. A total of 5 days of test fishing was missed due to regular days off. Only 4 drifts on 2 separate days were missed due to poor weather conditions or equipment failures. Climatological data is presented in Table 4. Seasonal test fishing data for 1993 is presented in Tables 5 through 7 and in Figures 3 and 4. Figure 3 shows testing fish CPUE by day for 1993. Figure 4 compares cumulative CPUE and cumulative proportions of CPUE indices.

The test fishing CPUE indices generated (number of salmon caught) is influenced considerably by commercial fishing activity in Kotzebue Sound, as well as the number of drifts conducted and their timing compared to commercial periods. In

addition, local salmon migration patterns can be greatly influenced by weather conditions. For these reasons, no interpolations were made for missing data points since accuracy of these values would be questionable.

## CONCLUSIONS

The Kobuk River test fishing project was successful in its first year of operation. The tannic staining of the river eliminated the salmon net avoidance problem often encountered on the Noatak River there by providing more reliable catch rate information than the former Noatak River test fishing project. Even during periods of clear water, the tannic stain provided enough concealment of gillnets that fish were caught throughout the run. Because of the shortened commercial season, any effect on the Kobuk River salmon passage on a period by period basis is hard to correlate. However, approximately 1 week after the commercial season began catch rates dropped off in the test fishery. There were also several days of strong passage roughly one week after commercial periods were closed. With the narrower river and the absence of side channels for fish to move through, catch rates are probably more accurate than the former Noatak test fishing site where there were marginal side channels and the crew was working a much wider river.

Aerial surveys conducted on tributaries and the upper main stem of the Kobuk River indicated that overall escapement goals were met in 1993. Only one of the four escapement indices in the Kobuk River drainage was below the aerial escapement goal. It will take several additional years of correlating data to be able to make in-season run assessments based on the test fishery. Catch rates from the test fishery seemed to track with local subsistence catches.

In the past there was only limited inseason escapement information provided by subsistence fishermen for the Kobuk River. This information was usually not available in a comprehensive or timely manner. With a test fish crew in Kiana, travel to subsistence fish camps to compare test fishing catch rates with subsistence catch rates is now feasible.

Given time to build a data base, even with the distance from the commercial fishery to the Kobuk River test fishing sites, this project should be able to give managers inseason assessment of run strength and run timing into the Kobuk River with only a few days lag time.

Table 1. Kobuk River drift test fish chum salmon CPUE by day, drift, and site, 1993. <sup>a</sup>

Date	CPUE by Drift <sup>b</sup>			CPUE by Site <sup>c</sup>		Daily CPUE	Cumm. CPUE
	#1	#2	#3	N	S		
12-Jul	15.48	2.50	16.00	1.74	20.43	11.18	11.18
13-Jul	5.39	15.50	25.41	0.00	28.87	14.22	25.40
14-Jul	13.19	0.00	46.06	0.00	39.72	20.57	45.97
15-Jul	20.57	33.91	46.53	26.67	41.96	35.08	81.05
16-Jul	2.70	32.50	2.73	21.82	5.11	13.19	94.24
17-Jul	23.48	28.70	0.00	1.74	32.57	17.27	111.51
18-Jul <sup>d</sup>							111.51
19-Jul	5.45	2.70	23.48	0.00	21.02	10.71	122.22
20-Jul	2.79	5.39	0.00	5.45	0.00	2.76	124.98
21-Jul	2.76	5.52	1.90	0.00	7.38	3.20	128.18
22-Jul	2.79	0.00	13.19	1.86	9.09	5.52	133.70
23-Jul	2.70	26.09	51.61	16.12	37.71	27.15	160.85
24-Jul	8.18	8.09	10.91	3.69	14.22	9.06	169.91
25-Jul <sup>d</sup>							169.91
26-Jul	10.91	8.09	26.37	0.00	29.57	15.22	185.13
27-Jul	15.48	8.09	0.00	0.00	15.88	8.06	193.19
28-Jul	11.16	16.18	21.57	17.91	14.77	16.36	209.55
29-Jul	2.73	0.00	0.00	0.00	1.83	0.93	210.48
30-Jul	0.00	0.00	2.76	0.00	1.82	0.92	211.40
31-Jul	16.18	16.18	5.39	1.85	22.77	12.58	223.98
01-Aug <sup>d</sup>							223.98
02-Aug <sup>e</sup>		0.00	13.33	13.04	0.00	6.74	230.72
03-Aug	42.20	71.49	<sup>e</sup>	58.72	55.38	57.08	287.80
04-Aug	16.74	60.00	51.26	20.94	68.33	44.23	332.03
05-Aug	40.85	191.60	2.73	15.65	151.66	89.30	421.33
06-Aug	12.77	13.79	29.33	14.33	22.77	18.60	439.93
07-Aug	47.50	2.76	8.37	24.17	16.62	20.52	460.45
08-Aug <sup>d</sup>							460.45
09-Aug	5.52	0.00	0.00	0.00	3.69	1.84	462.29
10-Aug	0.00	8.09	29.33	24.89	0.00	12.63	474.92
11-Aug	11.29	40.42	0.00	1.86	33.53	18.11	493.03
12-Aug	11.29	0.00	0.00	7.44	0.00	3.74	496.77

<sup>a</sup> Catch per unit effort is calculated in catch/100fm/hour<sup>b</sup> Drift 1 begins at 0800, Drift 2 at 1500, Drift 3 at 2200.<sup>c</sup> Site N is the North Bank (right bank), Site S is the South Bank (left bank).<sup>d</sup> Regular Day Off<sup>e</sup> Data unavailable due to poor weather conditions.

Table 2. Kobuk River drift test fish chum salmon CPUE indices, mean CPUE and percent by drift (time of day) and site (location), 1993.

Drift Period	Season CPUE Indices	No. of Period Drifts	Season Mean CPUE	Percent	Station Period	Season CPUE Indices	No. of Site Drifts	Season Mean CPUE	Percent
1 0800 hrs.	350.1	27	13.0	25.4	N North Bank	279.9	28	10.0	28.7
2 1500 hrs.	597.6	28	21.3	43.4	S South Bank	696.7	28	24.9	71.3
3 2200 hrs.	428.3	27	15.9	31.1					
Total	1,376.0	82	16.8	100.0		976.6	56	17.4	100.0

Table 3. Comparison of chum salmon age and sex composition and mean length in the Kotzebue District commercial catch and commercial test nets compared to the Kobuk River and Noatak River drift test fish catch, 1993.

		Brood Year and (Age Group)					
		1990 (0.2)	1989 (0.3)	1988 (0.4)	1987 (0.5)	1986 (0.6)	Total
Stratum Dates: 7/8-8/28		Kotzebue Commercial Catch and Commercial Test Net					
Sampling Dates: 7/9-8/28							
Sample Size: 3,707							
Female	Percent of Sample	1.1	12.9	33.1	2.0	0.1	49.1
	Number in Sample	40	479	1,226	73	2	1,820
	Mean Length	563.8	590.3	606.0	617.8	625.0	
	Standard Error (Length)	4.2	1.2	0.8	3.1	6.0	
Male	Percent of Sample	1.8	13.4	33.4	2.2	0.1	50.9
	Number in Sample	66	497	1,237	83	4	1,887
	Mean Length	571.8	611.2	627.9	638.1	700.8	
	Standard Error (Length)	3.7	1.6	1.0	4.4	14.9	
Total	Percent of Sample	2.9	26.3	66.4	4.2	0.2	100.0
	Number in Sample	106	976	2,463	156	6	3,707
	Standard Error	10	27	29	12	2	
Stratum Dates: 7/12-8/12		Kobuk River Drift Test Fish					
Sampling Dates: 7/12-8/12							
Sample Size: 462							
Female	Percent of Sample	0.6	14.5	30.5	1.7		47.4
	Number in Sample	3	67	141	8		219
	Mean Length	556.7	580.0	594.3	623.1		
	Standard Error (Length)	17.6	3.1	2.3	11.8		
Male	Percent of Sample	1.1	14.3	35.5	1.7		52.6
	Number in Sample	5	66	164	8		243
	Mean Length	565.0	611.1	624.2	629.3		
	Standard Error (Length)	6.9	4.8	2.7	12.3		
Total	Percent of Sample	1.7	28.8	66.0	3.5		100.0
	Number in Sample	8	133	305	16		462
	Standard Error	3	10	10	4		
Stratum Dates: 7/24-9/13		Noatak River Drift Test Fish					
Sampling Dates: 7/24-9/13							
Sample Size: 956							
Female	Percent of Sample	2.9	19.7	34.0	0.6	0.1	57.4
	Number in Sample	28	188	325	6	1	549
	Mean Length	539.1	557.7	571.6	562.3	650.0	
	Standard Error (Length)	5.1	2.3	1.9	12.8	0.0	
Male	Percent of Sample	1.9	14.6	24.8	1.2	0.2	42.6
	Number in Sample	18	139	237	11	2	407
	Mean Length	541.8	581.1	604.2	624.5	652.0	
	Standard Error (Length)	6.2	3.0	2.4	9.6	24.0	
Total	Percent of Sample	4.8	34.2	58.8	1.8	0.3	100.0
	Number in Sample	46	327	563	17	3	956
	Standard Error	7	15	15	4	2	

Table 4. Kobuk River climatological data, 1993.

Date	Time	Secchi (meters)	Wind		Cloud Cover	Precip.
			mph	direction		
12-Jul	1538	2.5	<sup>a</sup>	south	1	7
13-Jul	1504	1.4	<sup>a</sup>	west	1	7
14-Jul	1535	1.8	<sup>a</sup>	southwest	3	7
15-Jul	1540	1.5	<sup>a</sup>	west	1	7
16-Jul	1500	2.8	calm		2	7
17-Jul	1020	2.3		west	1	7
18-Jul						
19-Jul	1530	2.3	8	west	1	7
20-Jul	1030	2.3	calm		1	7
21-Jul	1030	3.3	calm		1	7
22-Jul	830	2.2	calm		1	7
23-Jul	830	3.9	5	east	1	7
24-Jul	1530	2.0	15	west	1	7
25-Jul						
26-Jul	1530	3.0	10	west	1	7
27-Jul	1550	2.3	10	west	1	7
28-Jul	830	3.4	calm		3	1
29-Jul	830	3.3	10	southwest	4	2
30-Jul	1050	3.5	calm		3	2
31-Jul	830	3.2	calm		3	2
01-Aug						
02-Aug	1530	1.8		west	4	2
03-Aug	830	2.1	calm		3	2
04-Aug	840	1.3	calm		4	2
05-Aug	1030	0.6	10	west	3	2
06-Aug	1000	0.5	calm		1	7
07-Aug	830	1.0	calm		1	7
08-Aug						
09-Aug	1130	1.1	calm		1	7
10-Aug	1100	1.5	calm		1	7
11-Aug	1130	1.5	5	south	3	7
12-Aug	830	2.0	calm		1	7

<sup>a</sup> Wind speed unavailable.Cloud Cover:

- 0 – No observation
- 1 – Clear sky; cloud cover less than 1/10th of the sky
- 2 – Cloud cover not more than 1/2 of the sky
- 3 – Cloud cover more than 1/2 of the sky
- 4 – Sky is completely overcast
- 5 – Fog or thick haze (smoke, dust, etc.)

Precipitation:

- 0 – No observation
- 1 – Intermittent rain
- 2 – Continuous rain
- 3 – Snow
- 4 – Snow and rain mix
- 5 – Hail
- 6 – Thunderstorm
- 7 – No precipitation

Table 5. Kobuk River drift test fish chum salmon diurnal and spacial distribution expressed as mean CPUE by drift period and by site, 1993. <sup>a</sup>

Year	Mean CPUE by Drift Period <sup>b</sup>			Yearly Mean CPUE	Percent Mean CPUE by Drift Period <sup>b</sup>			Mean CPUE by Site		Yearly Mean CPUE	Percent Mean CPUE by Site	
	1	2	3		1	2	3	N	S		N	S
1993	13.0	21.3	15.9	16.8	25.4	43.4	31.1	10.0	24.9	17.4	28.7	71.3

<sup>a</sup> Drift 1 begins at 0800, Drift 2 at 1500, Drift 3 at 2200.

<sup>b</sup> Site N is along the North Bank (right bank), Site S is South Bank (left bank).

Table 6. Kobuk River drift test fish CPUE  
and cumulative CPUE by drift,  
1993.

Date	Drift	1993	
		Daily	Cum.
12-Jul	1	15.5	15.5
	2	2.5	18.0
	3	16.0	34.0
13-Jul	1	5.4	39.4
	2	15.5	54.9
	3	25.4	80.3
14-Jul	1	13.2	93.5
	2	0.0	93.5
	3	46.1	139.5
15-Jul	1	20.6	160.1
	2	33.9	194.0
	3	46.5	240.5
16-Jul	1	2.7	243.2
	2	32.5	275.7
	3	2.7	278.5
17-Jul	1	23.5	302.0
	2	28.7	330.7
	3	0.0	330.7
18-Jul <sup>a</sup>	1		330.7
	2		330.7
	3		330.7
19-Jul	1	5.5	336.1
	2	2.7	338.8
	3	23.5	362.3
20-Jul	1	2.8	365.1
	2	5.4	370.5
	3	0.0	370.5
21-Jul	1	2.8	373.2
	2	5.5	378.7
	3	1.9	380.6
22-Jul	1	2.8	383.4
	2	0.0	383.4
	3	13.2	396.6
23-Jul	1	2.7	399.3
	2	26.1	425.4
	3	51.6	477.0
24-Jul	1	8.2	485.2
	2	8.1	493.3
	3	10.9	504.2
25-Jul <sup>a</sup>	1		504.2
	2		504.2
	3		504.2
26-Jul	1	10.9	515.1
	2	8.1	523.2
	3	26.4	549.6
27-Jul	1	15.5	565.1
	2	8.1	573.1
	3	0.0	573.1

Table 6. (Page 2 of 2)

Date	Drift	1993	
		Daily	Cum.
28-Jul	1	11.2	584.3
	2	16.2	600.5
	3	21.6	622.1
29-Jul	1	2.7	624.8
	2	0.0	624.8
	3	0.0	624.8
30-Jul	1	0.0	624.8
	2	0.0	624.8
	3	2.8	627.5
31-Jul	1	16.2	643.7
	2	16.2	659.9
	3	5.4	665.3
01-Aug <sup>a</sup>	1		665.3
	2		665.3
	3		665.3
02-Aug	1 <sup>b</sup>		665.3
	2	0.0	665.3
	3	13.3	678.6
03-Aug	1	42.2	720.8
	2	71.5	792.3
	3 <sup>b</sup>		792.3
04-Aug	1	16.7	809.1
	2	60.0	869.1
	3	51.3	920.3
05-Aug	1	40.9	961.2
	2	191.6	1,152.8
	3	2.7	1,155.5
06-Aug	1	12.8	1,168.3
	2	13.8	1,182.1
	3	29.3	1,211.4
07-Aug	1	47.5	1,258.9
	2	2.8	1,261.6
	3	8.4	1,270.0
08-Aug <sup>a</sup>	1		1,270.0
	2		1,270.0
	3		1,270.0
09-Aug	1	5.5	1,275.5
	2	0.0	1,275.5
	3	0.0	1,275.5
10-Aug	1	0.0	1,275.5
	2	8.1	1,283.6
	3	29.3	1,312.9
11-Aug	1	11.3	1,324.2
	2	40.4	1,364.7
	3	0.0	1,364.7
12-Aug	1	11.3	1,375.9
	2	0.0	1,375.9
	3	0.0	1,375.9

Table 7. Kobuk River drift test fish mean daily and cumulative CPUE, daily and cumulative CPUE proportions, 1993.

Date	CPUE		Proportion	
	Daily	Cum.	Daily	Cum.
12-Jul	11.18	11.2	0.023	0.023
13-Jul	14.22	25.4	0.029	0.051
14-Jul	20.57	46.0	0.041	0.093
15-Jul	35.08	81.1	0.071	0.163
16-Jul	13.19	94.2	0.027	0.190
17-Jul	17.27	111.5	0.035	0.224
18-Jul	*	111.5		0.224
19-Jul	10.71	122.2	0.022	0.246
20-Jul	2.76	125.0	0.006	0.252
21-Jul	3.20	128.2	0.006	0.258
22-Jul	5.52	133.7	0.011	0.269
23-Jul	27.15	160.9	0.055	0.324
24-Jul	9.06	169.9	0.018	0.342
25-Jul	*	169.9		0.342
26-Jul	15.22	185.1	0.031	0.373
27-Jul	8.06	193.2	0.016	0.389
28-Jul	16.36	209.6	0.033	0.422
29-Jul	0.93	210.5	0.002	0.424
30-Jul	0.92	211.4	0.002	0.426
31-Jul	12.58	224.0	0.025	0.451
01-Aug	*	224.0		0.451
02-Aug	6.74	230.7	0.014	0.464
03-Aug	57.08	287.8	0.115	0.579
04-Aug	44.23	332.0	0.089	0.668
05-Aug	89.30	421.3	0.180	0.848
06-Aug	18.60	439.9	0.037	0.886
07-Aug	20.52	460.5	0.041	0.927
08-Aug	*	460.5		0.927
09-Aug	1.84	462.3	0.004	0.931
10-Aug	12.63	474.9	0.025	0.956
11-Aug	18.11	493.0	0.036	0.992
12-Aug	3.74	496.8	0.008	1.000

\* Regular day off.

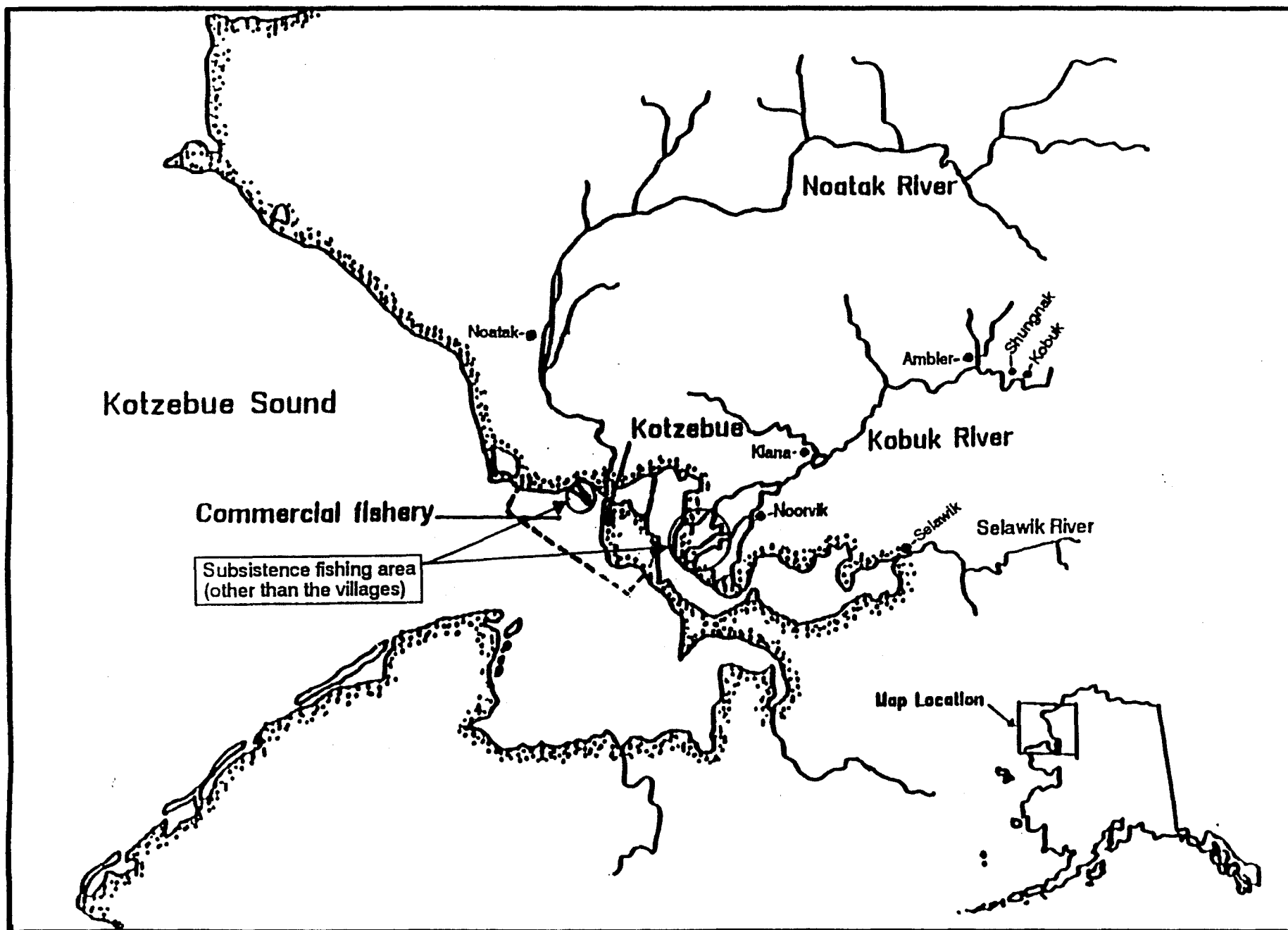


Figure 1. Kotzebue Sound commercial fishing district, villages and subsistence fishing areas, and major chum salmon spawning tributaries.

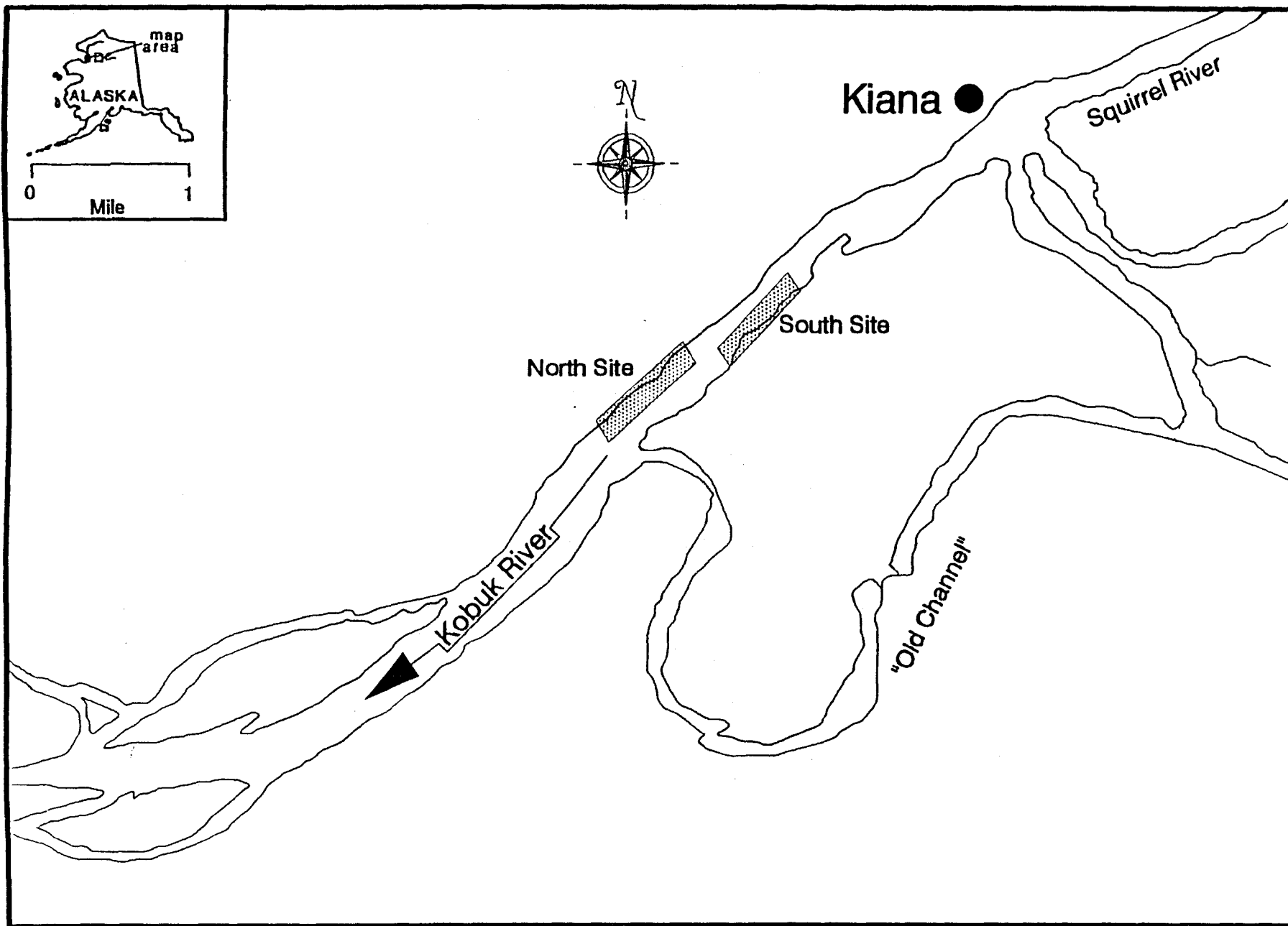


Figure 2. Lower Kobuk River, vicinity of Kiana, test fish sites.

# Kobuk River Drift Test Fish Daily CPUE, 1993

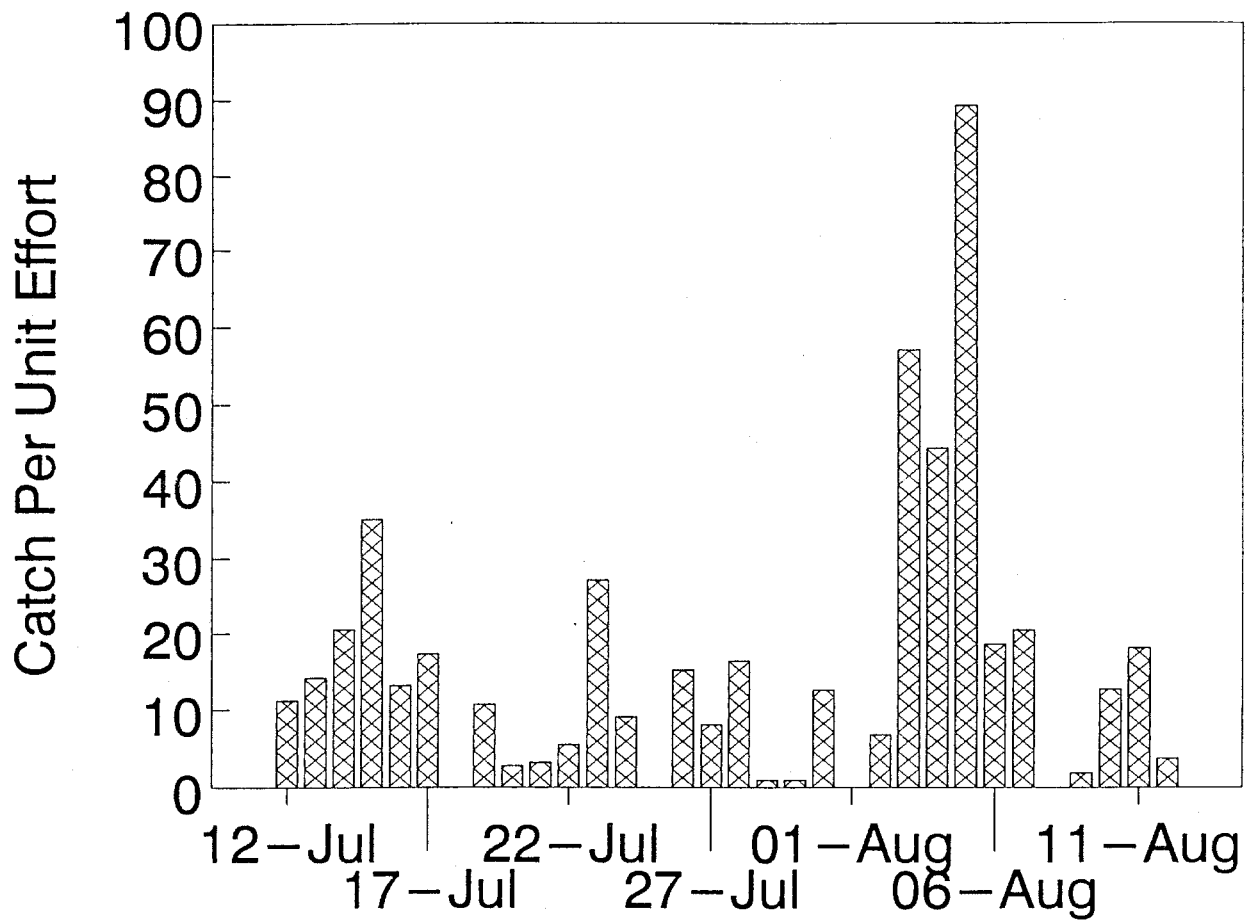


Figure 3. Kobuk River drift test fish daily CPUE, 1993.

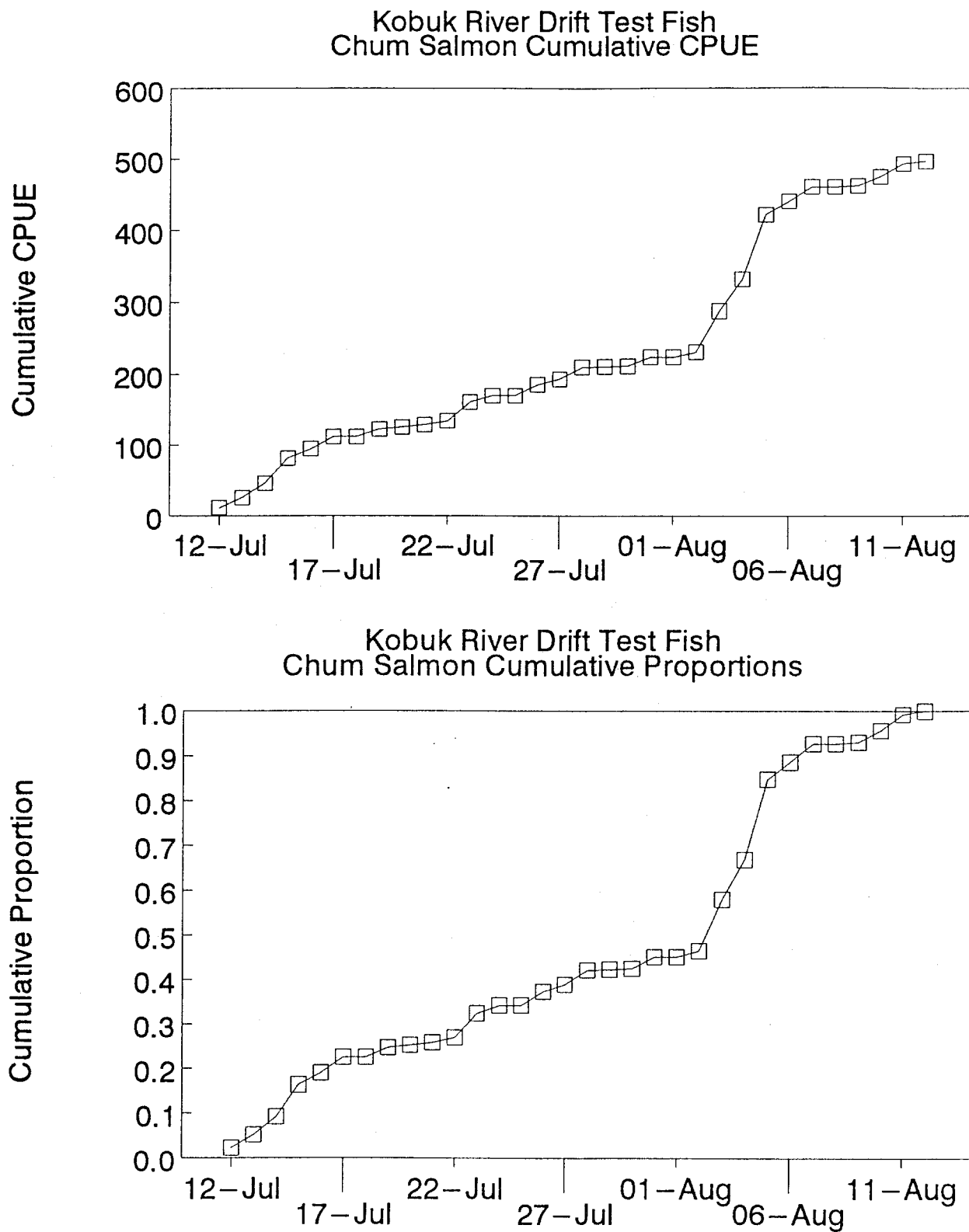


Figure 4. Kobuk River drift test fish cumulative CPUE and cumulative proportions, 1993.